

sent by far the stronger portion of the shower, will fall to the lot of American observers.

The calculated intensity of the shower is rather inferior to that of its prototype of 1868; besides, the first maxima fall early in the night, and may not, therefore, be seen at their best. Nevertheless, the present epoch is a well-defined one, and should yield satisfactory returns to the vigilance of meteor observers.

Of the minor showers associated with the period, the most interesting occur on November 16 between 13h. and 14h., and on November 17 from 13h. to 18h.

Dublin.

JOHN R. HENRY.

The Rusting of Iron.

IN reference to the discussion on the rusting of iron in recent numbers of NATURE, I happen to have a curious specimen illustrating the accumulating of rust which may possibly be of some little scientific value. It is a horse-shoe which was dug up some years ago by a child out of the sand on the site of the battle of Prestonpans, near Edinburgh. It was given me by the child's father, who was with him at the time. The shoe is now very irregular and lumpy. The thickness of the naked iron can be made out at one spot, where it is partially denuded. It is just three-eighths of an inch. But with the mass of what I can only describe as rust, and, I presume, sand—some small pebbles are, too, imbedded in it—it is in one spot as thick as 2 inches, and in girth it there measures 6½ inches. No part of it is wholly clear of rust; the smallest girth is 4 inches.

The famous battle was fought on September 21, 1745, and the supposition is that the shoe, if not the horse, was lost there. The supposition is probable enough. If correct, the rust would represent the accumulation in a century and a half. I may add that I have some specimens of pig-iron which were turned out at foundries here fifty years ago, and have been in the open air ever since. They have just a brown coat, but the coat is of no perceptible thickness.

JOSEPH MEEHAN.

Creevelea, Drumkeeran, October 29.

PROTOZOA AND STATOZOA.¹

THE late publication of the first volume of this well-known series has enabled the authors to incorporate some of the results of the more recent researches upon their several subjects. Taken in conjunction with the earlier published volumes, the work seems to fulfil the purpose of providing an intelligible and adequate survey of the entire animal kingdom without giving undue prominence to particular groups.

Prof. Hartog's share in the work makes a well-timed appearance in the year which has witnessed something like a crisis in the history of protozoology. His chapters are full of suggestive comparisons and analogies, and their value is increased by the addition of copious footnotes. Some of the statements are not supported by references, as, for example, where he speaks of the presence of a contractile vacuole in the zoospores of algæ and fungi without mentioning any specific instances of this condition (p. 15).

The essential complexity of the simplest manifestations of living matter is made evident, and Prof. Hartog does not harmonise the vitality of protoplasm with the vagaries of a drop of oil or of a bubble. The segmentation of the oosperm of Metazoa and Metaphyta is compared with the sporulation of the Protista, both phenomena being characterised as brood-formations (p. 31).

In the second chapter the author begins with an

¹ "The Cambridge Natural History." Vol. i. Protozoa, by Prof. Marcus Hartog; Porifera (Sponges), by Igerna B. L. Sollas; Cœlenterata and Ctenophora, by Prof. S. J. Hickson, F.R.S.; Echinodermata, by Prof. E. W. MacBride, F.R.S. Pp. xvii+671; illustrated. (London: Macmillan and Co., Ltd., 1906.) Price 17s. net.

interesting disquisition on the old belief in spontaneous generation as an explanation of the origin of the organisms of putrefaction, pointing out how this was due in part to the supposed inconstancy of species in Protista, and that this in turn resulted from the want of knowledge of their life-histories; how this knowledge was supplied in the first place by the Rev. W. H. Dallinger and Dr. Charles Drysdale for Protozoa, and for the Protophyta by F. Cohn and later by von Koch, who perfected the methods of culture devised by De Bary for the study of the fungi.

In his remarks on reproduction by syngamy, Prof. Hartog distinguishes between exogamy and endogamy, the rhizopod *Trichosphaerium* affording an example of the exogamous conjugation of biflagellate isogametes, while the heliozoan *Actinosphaerium* practises endogamy.

Referring to the pelagic foraminifer *Globigerina* (p. 61), the author says that after death the tests sink to the bottom of the sea to form the "Globerina ooze" (*sic*), "at depths where the carbonic acid under pressure is not adequate to dissolve the more solid calcareous matter." On the following page we read:—"Some Foraminifera live on the sea bottom



FIG. 1.—*Cerianthus membranaceus* in its tube. Colour pink, with tentacles annulated pink and brown. About 35 cm. in length. From "The Cambridge Natural History," vol. i.

even at the greatest depths, and of course their shell is not composed of calcareous matter." There is nothing to indicate to the reader why this is more obvious than any of the other plain statements in the book.

The last three chapters of Dr. Hartog's treatise deal with the Sporozoa, the Flagellata, the Ciliata, and the Suctoria. As an illustration of the rapid strides of recent years, he notes that seven years ago no single species of Sporozoa was known in its complete life-cycle. It would have been better to have used the general expression "body-cavity" instead of "coelom" on p. 105. Coelom and hæmocœl are both body-cavities, just as clothes props and thoroughbreds are both horses!

The importance of investigations into the life-

histories and microchemical properties of the Protozoa, which may be said to have achieved their present culmination in the life and death of Schaudinn, is worthily presented by Dr. Hartog.

Miss Sollas's three chapters commence with a brief historical introduction, followed by a lucid description of two typical British sponges, *Halichondria panicea* and *Ephydatia fluviatilis*. The traces of a nervous system referred to on p. 39 of this volume are not to be found here. Chapter viii. concludes with a key to British genera of sponges, comprising seventy-one names, and chapter ix. deals with questions of reproduction, physiology, and the formation of flints.

Turning now to Prof. Hickson's valuable contribution, we note that he treats the Cœlenterata and the Ctenophora as separate phyla instead of regarding the former as divisible into two branches, the Cnidaria, those which are armed with stinging threads, and the Ctenophora, those which are provided with swimming plates. A more serious change which he has introduced is the resolution of the old order Hydrocorallina into two distinct orders, Milleporina and Stylasterina, the former second, the latter

Prof. Hickson's last chapter is concerned with those wonderful creatures of the plankton, the Ctenophora. In describing the planes of symmetry of the body, the author speaks of the tentacular or "transverse" plane and of the "sagittal" plane. These animals show no antero-posterior differentiation, and only in one order, the Platycteneae, do they exhibit dorso-ventral differentiation; their symmetry is bi-radial, and it is undeniably inaccurate to saddle them with transverse and sagittal planes. If a comparison with higher forms must be made, there are strong reasons for the belief that the tentacular plane of the Ctenophora should be likened to the sagittal plane of Bilateralia.

In his account of the siphonophoran body (p. 298), Prof. Hickson evinces a general willingness to steer clear of wearisome polemical discussions; in this case the difficulty might have been surmounted by calling the various parts of the colony neither organs nor zooids, but organozooids.

The volume concludes with six chapters on the Echinoderms from the pen of Prof. MacBride. In the classification of the Ophiuroidea the author has followed Prof. Jeffrey Bell's system, which seems to

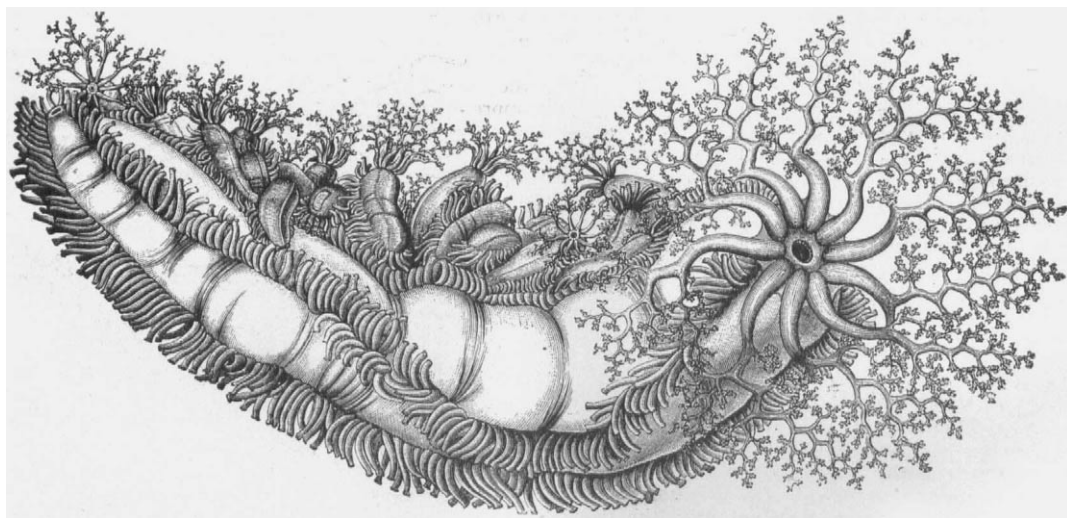


FIG. 2.—*Cucumaria crocea* carrying its young. $\times 1$. From "The Cambridge Natural History," vol. i.

sixth, in the list of orders, separated in the text by the Gymnoblastera, the Calyptoblastera, and even the Graptolitoidea.

With regard to the relations between the hydroid stock or hydrosome and the medusoid gonophore or medusome of the Hydrozoa, Prof. Hickson gives expression to the perennial "vexed question" as to whether the hydrosome preceded the medusome or *vice versa*; he does not assist the reader by adducing analogous instances. The stock and sexual stolon of some annelid worms would seem to offer an almost exact analogy to the hydroid and medusoid phases of a hydrozoan; the medusome might even be regarded as an epitokous sexual phase, the stock being the parent form, indifferently whether it is fixed or free; the liberation of the medusæ (where this occurs) would correspond broadly with the swarming of the epitokes.

The general treatment of the three classes, Hydrozoa, Scyphozoa, and Anthozoa, leaves little to be desired within the limits prescribed by the nature of the work, and prominence is given to bionomical questions.

have achieved the distinction of permanency. The tabulation of the families of Asteroidea is based upon Prof. Perrier's system, and gives a very different sequence from that based upon Mr. Sladen's orders, also in vogue at the present time. In the chapter on the Echinoidea (sea-urchins) there are interesting passages on the physiology of the pedicellariæ; the chapter on the Holothuroidea (sea-cucumbers) contains a humorous though instructive comparison between the organisation of a Synaptid and that of a Sipunculid.

The final chapter is devoted to questions of development and phylogeny. It seems probable to Prof. MacBride, and will doubtless appear so to his readers, "that Vertebrata and Echinodermata both arose from Protocœlomata." It remains to be added that the illustrations are excellent, and many of them original.

The term "Statozoa," originally applied to certain Echinodermata, but not generally adopted in that connection, may be conveniently extended so as to include such animals as sponges, cœlenterates, and echinoderms, in which a fixed condition is either actually or phyletically predominant.